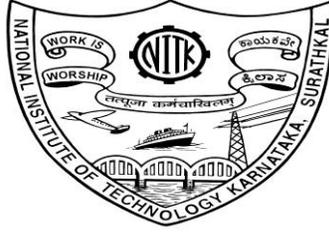


# NATIONAL INSTITUTE OF TECHNOLOGY KARNATAKA, SURATHKAL

DEPARTMENT OF MECHANICAL ENGINEERING  
 POST SRINIVASNAGAR, MANGALORE – 575 025 (D K)  
 Phone: (0824) 2474000. Fax: (0824) 2474033  
 E- mail: [info@nitk.ac.in](mailto:info@nitk.ac.in) Website: <http://www.nitk.ac.in>



## NOTICE INVITING QUOTATION

Notification. No: NITK/ME/SC/CGB/04

dated: 2/03/2023

<b>Name of Goods</b>	Customized Gear Box
<b>Estimated Amount:</b>	2 lakhs
<b>Time for Supply of item after release of Purchase order</b>	7 (Days)
<b>Document Download / Sale Start Date</b>	3/03/2023
<b>Clarification Start Date</b>	3/03/2023
<b>Clarification End Date</b>	4/03/2023
<b>Bid Submission Start Date</b>	3/03/2023
<b>Last Date for submission of bids</b>	11/03/2023 before 3.00 PM
<b>Bid Opening Date</b>	13/03/2023 before 3.00 PM
<b>Address for Submission of bids</b>	Dr. Saurabh Chandraker Assistant Professor Dept. of Mechanical Engineering, National Institute of Technology Karnataka Surathkal, Mangalore - 575 025 E-mail: <a href="mailto:schandraker@nitk.edu.in">schandraker@nitk.edu.in</a> Tel.: +91-8242473667 Mobile.: +91-9981640044



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**NOTICE INVITING QUOTATION (NIQ)**

The National Institute of Technology Karnataka, Surathkal (in short – NITK, Surathkal) is an Institute Of National Importance Under Ministry of Education Govt of India, imparting Technical Education and engaged in Research Activities. It is proposed to procure the items for the departmental academic/research activities.

Sealed Quotations as per the Price Schedule given in this NIQ are invited for the following items subject to the terms and conditions, from the reputed manufacturers or its authorised dealers so as to reach on or before scheduled date and time. The quotations in the firm's Business letter head should be address to the "Director, NITK, Surathkal". The envelope shall be superscribed with the Quotation Notification Number and the Name of the Goods for which quotation is submitted.

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<b>Bid Opening Date</b>	13/03/2023 <b>before 3.00 PM</b>

**Sd/-  
HOD**

Note: Institute shall not be responsible for any postal delay about non-receipt /non-delivery of the bids or due to wrong addressee.

**SECTION-1**  
**Terms and Conditions**

1. The rates should be quoted for preferably FOR destination from supply within India.
2. The bidder shall indicate the excise duty exemption for the goods if applicable.
3. The rate quoted should be on unit basis. Taxes and other charges should be quoted separately, considering exemptions if any. The rate should be quoted in INR only
4. Rate quoted should be inclusive of Testing, commissioning and Installation of equipment and Training.
5. Payment: No advance payment will be made. Payment will be made only after the supply of the item in good and satisfactory condition and receipt of performance security by supplier.
6. Guarantee/Warranty period should be specified for the complete period should be specified in section 3 of this tender document.
7. Period requirement for the supply and installation of item should be specified in section 3 of this tender document.
8. In case of dispute, the matter will be subject to Mangalore Jurisdiction only.

**SECTION-2**  
**SCHEDULE OF REQUIREMENTS, SPECIFICATIONS AND ALLIED DETAILS**  
[ To be filled up by the Department / Centre of NITK, Surathkal ]

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Item(s) Name to be Procured : Customized Gear Box

Brief Specifications of the Item(s)  
(Attach Additional Sheet if necessary) : Detailed Specification is attached below in Annexure-1

Quantity : 1

Any other details / requirement :

Warranty Period required : 2 yr

Delivery Schedule expected  
after placement of Purchase order  
(in Weeks) : 7 days

**SECTION 3**  
**PRICE SCHEDULE**

[ To be used by the bidder for submission of the quotation]

- 
1. Item Name :
  2. Specifications  
(Conforming to Schedule of requirements  
Enclose additional sheets if necessary) :
  3. Currency and Unit Price :
  4. Quantity :
  5. Item Cost (Sl No. 3 \* Sl. No. 4 ) :
  6. Taxes and Other Charges :  
(i) Specify the type of taxes and duties  
in percentages and also in figures.  
(ii) Specify Other Charges in figures.
  7. **Warranty Period** :  
**(Conforming to the Schedule of requirements)**
  8. Delivery Schedule :  
(Conforming to the Schedule of requirements)
  9. Name and address of the Firm for  
placing purchase order :
  10. Name and address of Indian authorized  
agent ( in case of imports only) :

**Signature of the Bidder:** \_\_\_\_\_

**Name and Designation:** \_\_\_\_\_

**Business Address** : \_\_\_\_\_

\_\_\_\_\_

**Place:**

**Date:**

**Seal of the Bidder's Firm**

**SECTION 4**  
**CONTRACT FORM**

[ To be provided by the bidder in the business letter head]

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1. (Name of the Supplier's Firm) hereby abide by the delivery schedule mentioned in this document for supply of the items if the purchase order is awarded.
2. The item will be supplied conforming to the specifications stated in this document without any defect and deviations.
3. Warranty will be given for the period mentioned in this document and service will be rendered to the satisfaction of NITK, Surathkal during this period.

**Signature of the Bidder:** \_\_\_\_\_

**Name** : \_\_\_\_\_

**Business Address** : \_\_\_\_\_

\_\_\_\_\_

**Place :**

**Date :**

**Seal of the Bidder's Firm**

## Annexure-1

# Specification Details

### Introduction

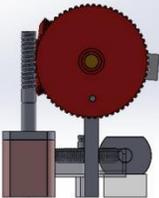
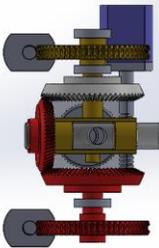
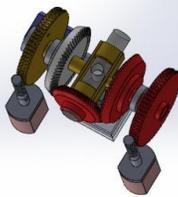
Design and modelling of Customized gear box, having combination of two Worm & wheel gear with Bevel Gear, have arrangement to take two different axis movement with two different inputs motor.

### Product Details

Customized Gear box inputs are connected with Worm & Worm Wheels, with the help of bearing that can be separated in two different inputs, one can runs Box for Single DOF(Axis1), another would be drive Bevel Gear for (axis2). Opening and closing motion controlled by third Worm & Worm wheel arrangement, which is mounted on the top of the Bevel Gear box.

### Required Parts

- Worm & Worm Wheels
- Bevel Gear
- Connecting Shafts

	
Figure:- Front View of Customized Gear Box	Figure:- Top View of Customized Gear Box
	
Figure:- Isometric View of Customized Gear Box	

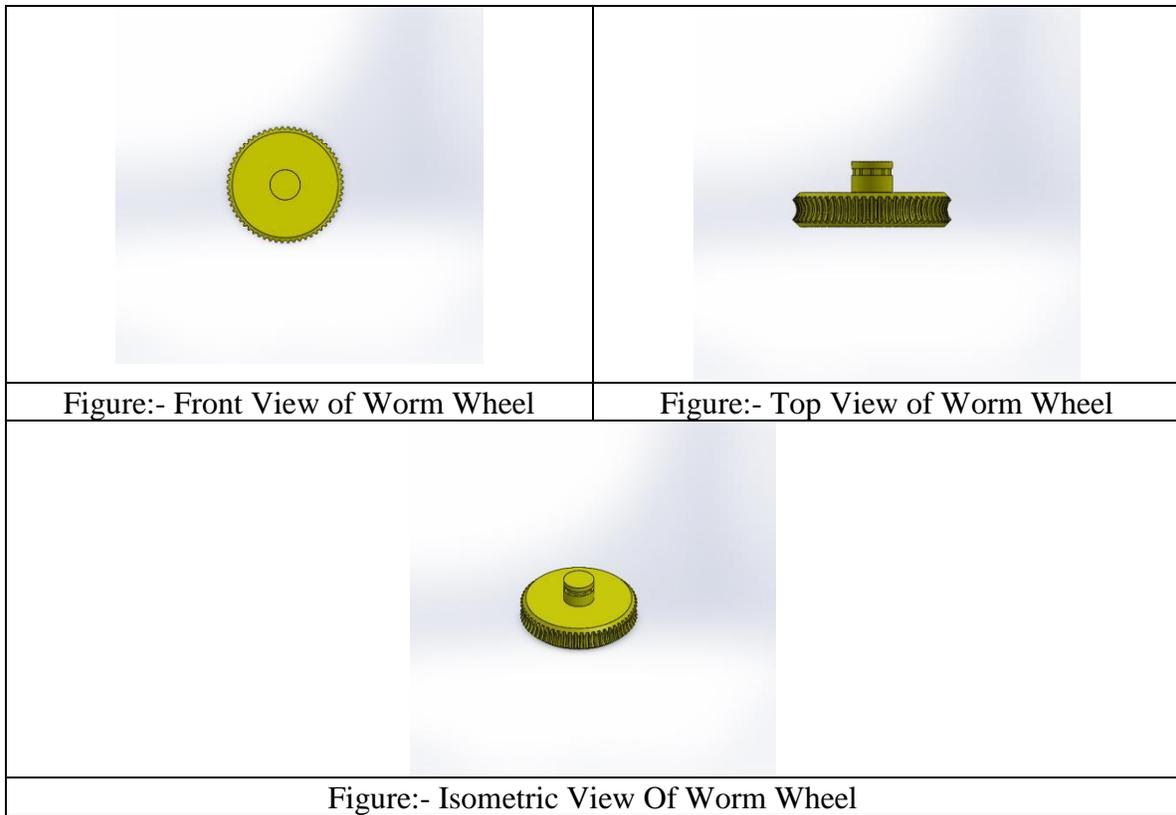
<b>Customized Gear Box</b>		
<b>S No.</b>	<b>Property</b>	<b>Value</b>
1	Mass	55988.97 Grams
2	Volume	55988810.69 mm <sup>3</sup>
3	Torque (for Output Shaft)	600Nm
4	Center Mass	X = -1887.87 Y = -308.84 Z = 321.84
5	Principal axes of inertia and principal moments of inertia (Gram, Square millimeter)	Ix = ( 0.13, 0.95, -0.27) Px = 2766278412.26 Iy = ( 0.28, 0.23, 0.93) Py = 4605596498.13 Iz = ( 0.95, -0.20, -0.24) Pz = 5711828160.07
6	Moments of inertia at the center of mass and aligned with the output coordinate system (Gram, Square millimeter)	Lxx = 5571867230.11 Lxy = 440775047.83 Lyx = 440775047.83 Lyy = 2981547723.97 Lzx = 185817908.71 Lzy = -534945200.10
7	Moments of inertia at the output coordinate system (Gram, Square millimeter)	Ixx = 16711724811.06 Ixy = 33085619369.59 Ixz = - 33832584200.13 Iyx = 33085619369.59 Iyy = 208329020973.55 Iyz = - 6100146656.96 Izx = -33832584200.13

## Worm & Worm Wheel

<b>Worm and Worm Wheel</b>		
<b>S No.</b>	<b>Property</b>	<b>Value</b>
1	Material	Worm Gear:- Alloy Steel SCM440 Worm Wheel:- Phosphor Bronze – Copper Alloy UNS C51000
2	Module	6 mm
3	Diameter of Worm Wheel	180mm
4	Diameter of Worm	56.54
5	Lead	18.8496mm
6	Face Width of Wheel	60mm
7	Lead Angle	6.0556

<b><u>Phosphor Bronze – Copper Alloy UNS C51000</u></b>		
<b>S No.</b>	<b>Property</b>	<b>Value</b>
1	Density	8.86 g/cm <sup>2</sup>
2	Melting Point	954°C
3	Tensile Strength	131-552 M Pa
4	Poisson's ratio	.034
5	Elastic Modulus	117 G Pa
6	Thermal Conductivity	84 W/nK

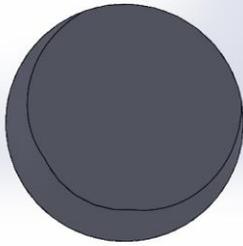
<b>Alloy Steel SCM440</b>		
<b>S No.</b>	<b>Property</b>	<b>Value</b>
1	Density	8030 kg/m <sup>2</sup>
2	Shear Yield Modulus	568 G pa
3	Tensile Strength	655 M Pa
4	Poisson's ratio	.27-.3
5	Elastic Modulus	190-210 G pa



<b>Worm Gear</b>		
<b>S No.</b>	<b>Property</b>	<b>Value</b>
1	Mass	14410 Grams
2	Volume	1973999 mm <sup>3</sup>
3	Center Mass	X = -203.12 Y = -21.07 Z = 216.02
4	Principal axes of inertia and principal moment of inertia (grams,mm <sup>2</sup> )	I <sub>x</sub> = ( 0.00, 0.00, 1.00) P <sub>x</sub> = 45296386.10 I <sub>y</sub> = ( 1.00, 0.00, 0.00) P <sub>y</sub> = 45296386.10 I <sub>z</sub> = ( 0.00, 1.00, 0.00) P <sub>z</sub> = 81078053.90
5	Moments of inertia: ( grams * square millimeters ) Taken at the center of mass and aligned with the output coordinate system	L <sub>xx</sub> = 45296386.15 L <sub>xy</sub> = 0.08 L <sub>xz</sub> = -0.02 L <sub>yx</sub> = 0.08 L <sub>yy</sub> = 81078053.90 L <sub>yz</sub> = -0.04 L <sub>zx</sub> = -0.02 L <sub>zy</sub> = -0.04

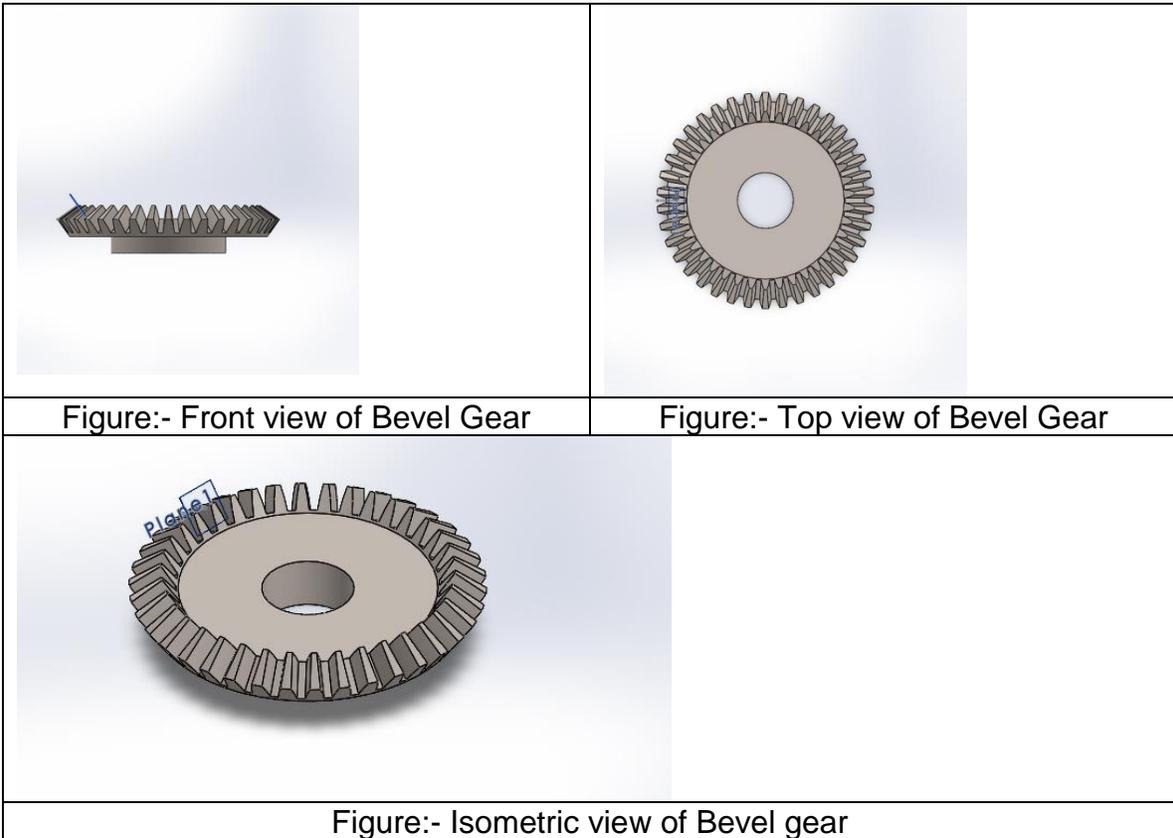
		Lzz = 45296386.04
6	Moments of inertia: ( grams * square millimeters ) Taken at the output coordinate system.	lxx = 724142434.92 lxy = 61664487.31 lxz = -632287882.99 lyx = 61664487.31 lyy = 1348052523.72 lzx = -632287882.99 lzy = - 65581352.56 lzz = 646216576.74

### Worm

	
<p>Figure:- Front View of Worm</p>	<p>Figure:- Top View of Worm</p>
	
<p>Figure:- Side View of Worm</p>	

<b>Worm wheel</b>		
<b>S No.</b>	<b>Property</b>	<b>Value</b>
1	Mass	157.20 Grams
2	Volume	19649 mm <sup>3</sup>
3	Center Mass	X= 0.01 Y= -0.01 Z= 40
4	Principal axes of inertia and principal moment of inertia (grams,mm <sup>2</sup> )	Ix = ( 0.00, 0.00, 1.00) Px = 6489.79 Iy = ( 0.07, -1.00, 0.00) Py = 87091.07 Iz = ( 1.00, 0.07, 0.00) Pz = 87099.1
5	Moments of inertia: ( grams * square millimeters ) Taken at the center of mass and aligned with the output coordinate system	Lxx = 87099.09 Lxy = -0.57 Lxz = 47.68 Lyx = -0.57 Lyy = 87091.10 Lyz = 29.16 Lzx = 47.68 Lzy = 29.16 Lzz = 6489.83
6	Moments of inertia: ( grams * square millimeters ) Taken at the output coordinate system.	Ixx = 338603.86 Ixy = -0.59 Ixz = 94.02 Iyx = -0.59 Iyy = 338595.85 Iyz = -50.81 Izx = 94.02 Izy = - 50.81 Izz = 6489.86

## Bevel Gear



Bevel Gear		
S No.	Property	Value
1	Mass	1193 Grams
2	Volume	151818 mm <sup>3</sup>
3	Center Mass	X= 00 Y=-68.65 Z= 00
4	Principal axes of inertia and principal moment of inertia (grams,mm <sup>2</sup> )	lx = ( 0.00, 0.00, 1.00) Px = 1193147.92 ly = ( 1.00, 0.00, 0.00) Py = 1193147.92 lz = ( 0.00, 1.00, 0.00) Pz = 2312333.48
5	Moments of inertia: ( grams * square millimeters ) Taken at the center of mass and aligned with the output coordinate system	Lxx = 1193147.92 Lxy = 0.00 Lxz = 0.00 Lyx = 0.00 Lyy = 2312333.48 Lyz = 0.00

		Lzx = 0.00 Lzy = 0.00 Lzz = 1193147.92
6	Moments of inertia: ( grams * square millimeters ) Taken at the output coordinate system.	lxx = 6817386.48 lxy = 0.00 lxz = 0.00 lyx = 0.00 lyy = 2312333.48 lyz = 0.00 lzx = 0.00    lzy = 0.00 lzz = 6817386.48
7	Module	7.5
8	Cone length of gear	132.2mm
9	Diameter of Gear	225mm
10	Face width of Gear	33.05
11	Cone length of pinion	132.2mm
12	Diameter of pinion	225mm
13	Face width of pinion	33.05mm
14	Gear ratio	1
	Pitch angle both gear and pinion	45°
15	Number of teeth	30
16	Material	Annealed Stainless Steel

## Shaft

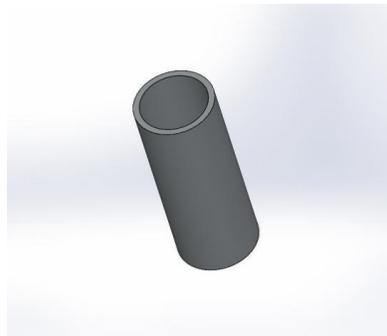


Figure:- Isometric view of Shaft

S. No.	Property	Specification
1	Material	Chrome Stainless Steel
2	Mass	54.88 Kg
3	Volume	7037167 cubic millimeters
4	Surface area	721309 square millimeters

5	Center of mass	X= 0, Y=400, Z=00
6	Mass Density	7800 Kg/m <sup>3</sup>
7	Elastic Modulus	2e+11 N/m <sup>2</sup>
8	Yield Strength	172339000 N/m <sup>2</sup>
9	Poisson's Ratio	0.28
10	Shear Modulus	7.7e+10 N/m <sup>2</sup>
11	Length of Shaft	800mm
12	Outer Diameter	160mm
13	Inner Diameter	120mm
14	Principal axes of inertia and principal moments of inertia taken at the centre of mass ( $g \times mm^2$ )	$I_x = (0.00, 1.00, 0.00)$ $P_x = 274449534.22$ $I_y = (0.00, 0.00, 1.00)$ $P_y = 3064686465.43$ $I_z = (1.00, 0.00, 0.00)$ $P_z = 3064686465.43$
15	Moments of inertia taken at the centre of mass and aligned with the output coordinate system ( $g \times mm^2$ )	$L_{xx} = 3064686465.43$ $L_{xy} = 0.00$ $L_{xz} = 0.00$ $L_{yx} = 0.00$ $L_{yy} = 274449534.22$ $L_{yz} = 0.00$ $L_{zx} = 0.00$ $L_{zy} = 0.00$ $L_{zz} = 30646864$
16	Moments of inertia taken at the output coordinate system ( $g \times mm^2$ )	$I_{xx} = 11847071560.39$ $I_{xy} = 0.00$ $I_{xz} = 0.00$ $I_{yx} = 0.00$ $I_{yy} = 274449534.22$ $I_{yz} = 0.00$ $I_{zx} = 0.00$ $I_{zy} = 0.00$ $I_{zz} = 11847071560$
17	Bending moment	200Nm
18	Torsion	600Nm
19	Factor of Safety	3
20	Shear Stress	500N/m <sup>2</sup>
21	Allowable Shear stress	83.3 N/m <sup>2</sup>